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STAFF REPORT

1979 PESTICIDE USE ON VEGETABLES
IN THE SOUTHWEST,
A PRELIMINARY REPORT

by

Walter L. Ferguson
and
Iris E. McCalla

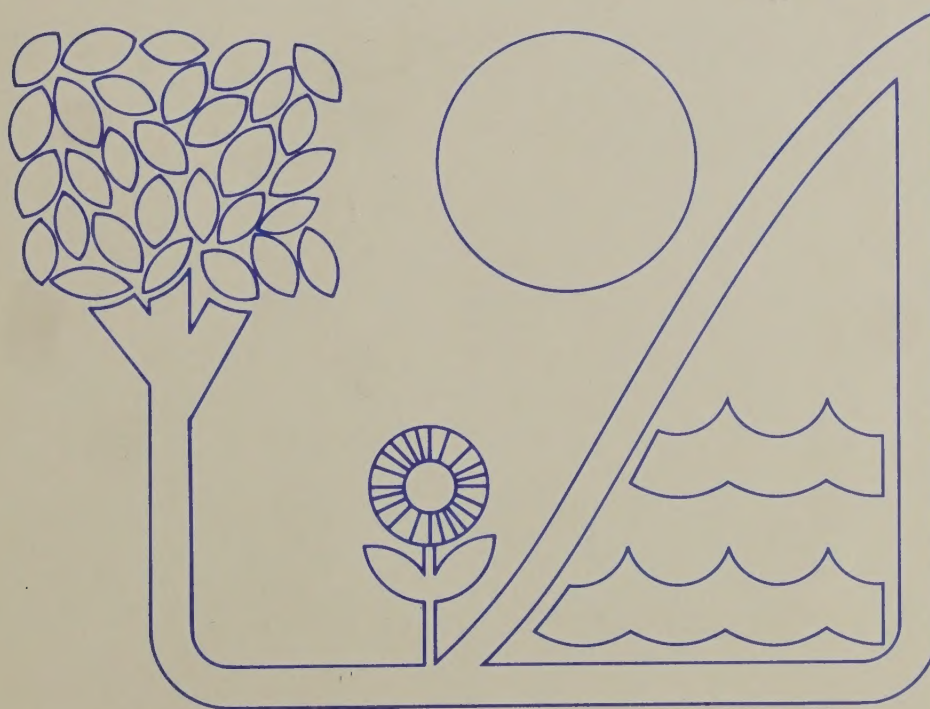
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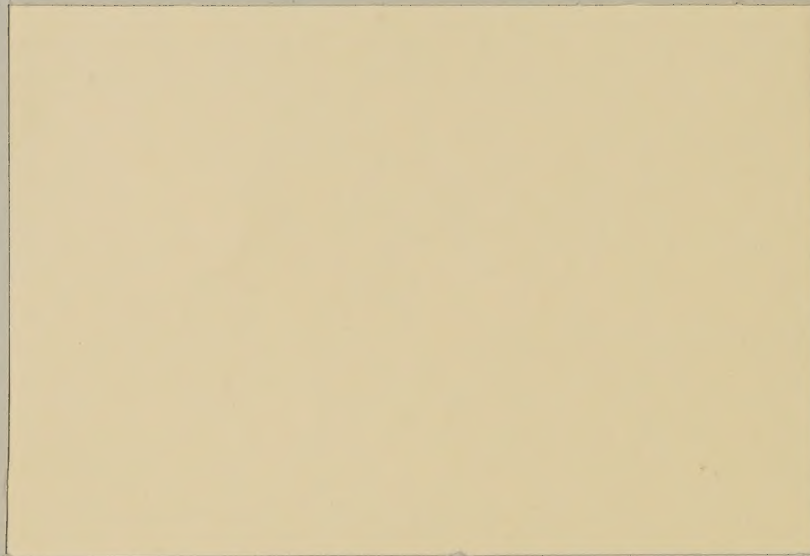
Staff Report No. AGES811221

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Walter L. Ferguson, and Iris E. McCalla. Natural Resource Economics Division,
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1979 PESTICIDE USE ON VEGETABLES IN THE SOUTHWEST, A PRELIMINARY REPORT. By Walter L. Ferguson and Iris E. McCalla; Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture, Washington, D.C. 20250; December 1981.

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ABSTRACT

According to U.S. Department of Agriculture's 1979 Vegetable Pesticide Survey, about 1.7 million pounds of pesticides were used to control weeds, insects, diseases, and nematodes on 10 vegetable crops in Arizona, Colorado, and Texas. The 10 vegetable crops included cabbage, cantaloups, carrots, cucumbers, lettuce, onions, snap beans, sweet corn, tomatoes, and watermelons. Nearly 1.1 million acre-treatments were made ranging from about 284,000 for onions to 4,000 for cucumbers and snap beans.

Key words: Pesticides, herbicides, fungicides, insecticides, nematocides, tank-mixes, acres treated, application rates, Southwest.

 * This paper was prepared for limited distribution to the research *
 * community outside the U.S. Department of Agriculture. The data in *
 * this report are preliminary, and consequently subject to change. *
 * The data have not been subjected to statistical reliability testing, *
 * but will be tested prior to finalization and publication. The final *
 * tabulation of the data will provide information for 6 regions which *
 * will include data for 18 States. The final tabulations are scheduled *
 * for publication in early 1982. The data are being released at this *
 * time to allow the agricultural community an opportunity to comment *
 * on the data. If you have any comments, please send them by March 15, *
 * 1982 to: *
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 * *****

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1979 PESTICIDE USE ON VEGETABLES IN THE SOUTHWEST, A PRELIMINARY REPORT

INTRODUCTION

In this report, patterns of pesticide use in the Southwest (Arizona, Colorado, and Texas) in 1979 are discussed for cabbage, cantaloups, carrots, cucumbers, lettuce, onions, snap beans, sweet corn, tomatoes, and watermelons. Survey data were collected on quantities of pesticides used, acres treated, acre-treatments, number of applications, annual rates, and rate per acre-treatment. This report provides information useful to policymakers, researchers, extension specialists, and industry personnel. Because vegetables are highly susceptible to weeds, insects, diseases, and other pest damage, there is a continuing need for information on pesticides used in vegetable production. Regulations on the use of pesticides and review of registrations by the Environmental Protection Agency create the need for accurate, detailed information for economic studies of pesticide use.

A major factor affecting the quantity of pesticides used is the number of acres planted. For most of the 10 vegetable crops, the number of acres planted in 1979 closely approximates the average acreage planted for 1978-80 (Table 1). A difference of about 4 percent is indicated for the 10 crop total, 269,500 acres in 1979 versus 260,000 for the 3-year average. The decreased planted acreage in 1980 from 1978 and 1979 for watermelons and cantaloups may reflect increased prices of soybeans and other substitute crops. Overall, 1979 could be described as a typical year for acreage of vegetables planted. The number of planted acres, however, is only one of several factors affecting pesticide usage. Weather conditions, pest infestations, and pest resistance to pesticides affect pesticide rates and the number of applications per season.

Planted acreage for the 10 crops surveyed in 1979 ranged from nearly 58,000 acres for lettuce to about 1,700 acres for snap beans. With the exception of

Table 1. Acres planted in 1979 compared with 1978-80 average, 10 vegetables, Southwest a/

Crop	: Fresh market			: Processing market			: Fresh and processing market	
	:	:	:	:	:	:	:	:
	: 1978	: 1979	: 1980	: 1978	: 1979	: 1980	: 1979	: 3-year average
----- 1,000 acres -----								
Cabbage	23.0	23.7	20.8	<u>b/</u>	<u>b/</u>	<u>b/</u>	23.7	22.5
Cantaloups	31.6	29.1	24.6	--	--	--	29.1	28.4
Carrots <u>c/</u>	--	--	--	--	--	--	23.7	21.7
Cucumbers	10.2	7.8	11.6	10.0	10.9	12.3	18.7	20.9
Lettuce	53.9	58.0	51.8	--	--	--	58.0	54.6
Onions <u>c/</u>	--	--	--	--	--	--	42.5	42.3
Snap beans	--	--	--	1.6	1.7	1.0	1.7	1.4
Sweet corn	6.3	4.9	4.0	--	--	--	4.9	5.1
Tomatoes	7.3	7.0	6.2	4.0	3.3	2.2	10.3	10.0
Watermelons	58.8	56.8	43.6	--	--	--	56.8	53.1
Total	--	--	--	--	--	--	269.4	260.0

a/ "Vegetables, 1980 Summary," U.S. Dept. Agr., Vg 1-2(80), December 1980.

b/ Less than 50 acres.

c/ Acreage data for the fresh and processing markets are not available separately for carrots and onions. Production data for 1979 reported in "Agricultural Statistics, 1980" indicated that 95 percent or more of the Southwest carrot and onion production was sold in the fresh market.

snap beans, tomatoes, and cucumbers, the vegetable crops grown in the Southwest are sold mainly in the fresh market. As pests affect not only yield but also quality, the appearance of the product has a considerable impact on market price. Thus, for these fresh market and processing crops, pesticides are especially important.

METHODOLOGY

As part of a national survey of pesticide use on vegetables, Southwest vegetable growers were personally interviewed to collect data on specific pesticides used, acres treated, methods of application, and target pests controlled in 1979. Approximately 200 growers were interviewed in Arizona, 250 in Colorado, and 400 in Texas.

A random sample design was used to select growers. Data were expanded for individual farms in the survey to reflect all farms by multiplying the sample data by the inverse of the sample ratio for each stratum. The pesticide use data for each crop were then adjusted by the ratio of the number of acres of each crop grown in the State to the number of expanded sample acres for the crop grown.

INTERPRETING THE DATA

Pesticides are grouped into the following categories: (1) herbicides (used to kill plants or inhibit their growth), (2) insecticides (used to kill or inhibit insects), (3) fungicides (used to control diseases by killing or inhibiting fungi), and (4) nematicides (used to kill or inhibit nematodes and other organisms in the soil). Bactericides (used to control bacterial diseases) are grouped with fungicides while multi-purpose soil fumigants are included in nematicides.

The term, "acres treated", is used to identify acres receiving one or more

application of a specific pesticide. Acres treated are not additive because two or more different specific ingredients may have been used on the same acre. As these acres are not mutually exclusive, summing them could result in double counting. For this reason, the sums of acres treated are not shown in Tables 5 through 25.

"Acre-treatments" are the number of acres treated one time with a specific pesticide. The number of applications per season was derived by dividing the acre-treatments by the acres treated for each specific pesticide material.

Single applications and annual rates are estimated for specific active ingredients. Annual rates include the average rate for all seasons (winter, spring, summer, and fall). The single application rate is derived by dividing the total active ingredients of a specific pesticide by the number of acre-treatments; the annual rate is derived by dividing the total active ingredients by the number of acres treated.

Acres treated and acre-treatments for Bacillus thuringiensis, a bacterium, are included in the insecticide category. The rates and quantities applied are not reported since application rates are expressed in terms of spores per gram rather than in pounds of active ingredient.

The rate per application and number of applications for specific pesticides may vary considerably from published guidelines for a number of reasons. For example, published rates are generally broadcast rates whereas a number of the rates reported in the survey were band or in-furrow rates which are one-fourth to one-third that of the broadcast rates. Also, young vegetable plants require considerably lower dosage rates of insecticides and fungicides than do older plants. For insect and weed control, vegetables grown on sandy soils generally require lower rates of insecticides and herbicides than the same vegetables grown on organic soils.

Weather plays an important role in the use of fungicides as low moisture years generally require lower rates and fewer applications than high moisture years. Some varieties of vegetables have greater resistance to specific diseases and are less attractive to insects than other varieties, requiring lower rates and fewer applications. Also resistance of pests to pesticides plays an important role in determining rates and number of applications. Rates are generally lower when two or more pesticides with the same spectrum of control are applied in tank-mix applications than when those respective pesticides are applied as single ingredients.

RESULTS

In 1979, Southwest growers planted about 270,000 acres of cabbage, cantaloupes, carrots, cucumbers, lettuce, onions, snap beans, sweet corn, tomatoes, and watermelons, of which more than 70 percent were planted for the fresh market (Table 2). Lettuce, watermelons, and onions comprised nearly 60 percent of the total acreage.

The growers used approximately 1.1 million acre-treatments of pesticides for the 10 crops with Texas accounting for about 70 percent of the total (Table 3). Insecticides applied as single ingredients accounted for about 418,000 acre-treatments or about 40 percent of the total, followed by fungicides with 31 percent, and herbicides with 13 percent. Cabbage and lettuce accounted for about 65 percent of the insecticide acre-treatments, and cabbage, onions, and watermelons about 75 percent of the fungicide acre-treatments. Tank-mix applications applied to the 10 crops accounted for about 183,000 acre-treatments, or about 17 percent of the 1.1 million acre-treatments.

The growers applied approximately 1.7 million pounds of active ingredients (a.i.) to the 10 crops (Table 4). Texas cabbage and onion growers accounted for about 40 percent of the total 1.7 million pounds (a.i.) applied in the

Table 2. Vegetables: Acres planted, fresh and processing market, Southwest, 1979 a/

Crop	: Processing	:	Fresh market				: Total, fresh and
	: market	:	Winter	Spring	Summer	Fall: Total	: processing market
----- 1,000 acres -----							
<u>Cabbage</u>							
Colorado	b/	--	--	1.8	--	1.8	1.8
Texas	--	11.1	4.3	--	6.5	21.9	21.9
Region	b/	11.1	4.3	1.8	6.5	23.7	23.7
<u>Cantaloups</u>							
Arizona	--	--	5.1	2.0	2.0	9.1	9.1
Colorado	--	--	--	1.0	--	1.0	1.0
Texas	--	--	12.5	6.5	--	19.0	19.0
Region	--	--	17.6	9.5	2.0	29.1	29.1
<u>Carrots c/</u>							
Arizona	--	--	--	--	--	--	2.0
Colorado	--	--	--	--	--	--	1.1
Texas	--	--	--	--	--	--	20.6
Region	--	--	--	--	--	--	23.7
<u>Cucumbers</u>							
Colorado	2.4	--	--	--	--	--	2.4
Texas	8.5	--	2.9	1.3	3.6	7.8	16.3
Region	10.9	--	2.9	1.3	3.6	7.8	18.7
<u>Lettuce</u>							
Arizona	--	14.1	13.6	--	17.9	45.6	45.6
Colorado	--	4.2	--	6.3	--	10.5	10.5
Texas	--	--	--	--	1.9	1.9	1.9
Region	--	18.3	13.6	6.3	19.8	58.0	58.0
<u>Onions c/</u>							
Arizona	--	--	--	--	--	--	1.6
Colorado	--	--	--	--	--	--	8.2
Texas	--	--	--	--	--	--	32.7
Region	--	--	--	--	--	--	42.5
<u>Snap beans</u>							
Colorado	1.7	--	--	--	--	--	1.7
Region	1.7	--	--	--	--	--	1.7
<u>Sweet corn</u>							
Colorado	--	--	--	3.4	--	3.4	3.4
Texas	--	--	1.5	--	--	1.5	1.5
Region	--	--	1.5	3.4	--	4.9	4.9

-- continued

Table 2. Vegetables: Acres planted, fresh and processing market, Southwest, 1979 a/ -- continued

Crop	: Processing	:	Fresh market					: Total, fresh and
	: market	:	Winter	Spring	Summer	Fall	Total	: processing market
----- 1,000 acres -----								
<u>Tomatoes</u>								
Colorado	0.8	--	--	--	--	--	--	0.8
Texas	2.5	--	3.3	3.1	0.6	7.0		9.5
Region	3.3	--	3.3	3.1	.6	7.0		10.3
<u>Watermelons</u>								
Arizona	--	--	2.0	4.3	--	6.3		6.3
Texas	--	--	25.5	25.0	--	50.5		50.5
Region	--	--	27.5	29.3	--	56.8		56.8
10 Crops	--	--	--	--	--	--		269.4

a/ "Vegetables, 1980 Summary," U.S. Dept. Agr., Vg 1-2(80), December 1980.

b/ Less than 50 acres.

c/ Acreage data for the fresh and processing markets are not available separately for carrots and onions. Production data for 1979 reported in "Agricultural Statistics, 1980" indicated that 95 percent or more of the Southwest carrot and onion production was sold in the fresh market.

Table 3. Vegetables: Acre-treatments of pesticide by crop, single ingredient and tank-mix applications, Southwest, 1979 a/

Pesticide	: Cantaloupes	: Carrots	: Cucumbers	: Lettuce	: Onions	: Snap beans	: Sweet corn	: Tomatoes	: Watermelons	: Total
----- 1,000 acre-treatments -----										
<u>Single applications</u>										
Herbicides	22.8	2.1	17.1	.3	25.8	47.3	1.3	0.4	1.5	136.9
Insecticides	158.4	5.4	9.9	1.2	121.1	52.0	1.6	24.2	10.2	417.6
Fungicides	54.2	14.8	35.8	2.2	16.1	146.3	.3	2.6	6.3	336.3
Nematicides	.3	--	2.1	.1	--	--	--	--	--	2.5
Sprout control	--	--	--	--	--	1.5	--	--	--	1.5
<u>Tank-mix applications</u>										
	14.5	2.7	2.1	b/	89.7	36.6	.7	21.0	2.2	182.9
Total c/	250.2	25.0	67.0	3.8	252.7	283.7	3.9	48.2	20.2	1,077.7
<u>By State:</u>										
Arizona	--	--	6.7	--	154.4	11.5	--	--	--	174.8
Colorado	14.4	4.1	.5	1.6	46.3	41.3	3.9	--	--	112.1
Texas	235.9	20.9	59.8	2.3	51.9	230.9	--	48.1	20.1	790.7
Total c/	250.3	25.0	67.0	3.9	252.6	283.7	3.9	48.1	20.1	1,077.6

- None reported in survey sample.

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ Less than 50 acre-treatments.

c/ Totals may not agree due to rounding.

Table 4. Vegetables: Quantities of pesticides used by crop, single ingredient and tank-mix applications, Southwest, 1979 a/

Pesticide	: Cantaloupes	: Cucumbers	: Lettuce	: Onions	: Beans	: Sweet corn	: Tomatoes	: Watermelons	: Total		
----- 1,000 pounds (a.i.) -----											
By category:											
Single applications											
Herbicides	49.6	26.5	13.9	0.9	39.7	169.0	1.9	0.2	3.2	15.6	320.5
Insecticides	102.9	25.0	6.9	.9	80.0	45.6	1.1	21.4	6.6	24.7	315.1
Fungicides	80.8	86.4	53.7	3.0	25.0	232.2	.2	4.2	9.7	66.1	561.3
Nematicides	42.1	38.9	113.8	3.6	--	--	--	--	--	--	198.4
Sprout control	--	--	--	--	--	4.2	--	--	--	--	4.2
Tank-mix applications											
Total	20.1	7.6	19.6	b/	123.4	87.8	1.7	19.8	4.6	32.1	316.7
	295.5	184.4	207.9	8.4	268.1	538.8	4.9	45.6	24.1	138.5	1,716.2
By State:											
Arizona	--	32.9	53.1	--	157.7	16.4	--	--	--	2.2	262.2
Colorado	58.9	4.3	.2	2.2	58.3	93.4	5.0	--	--	--	222.3
Texas	236.7	147.1	154.6	6.2	52.1	429.0	--	45.6	24.1	136.3	1,231.7
Total c/	295.6	184.3	207.9	8.4	268.1	538.8	5.0	45.6	24.1	138.5	1,716.3

-- None reported in survey sample.

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ Less than 50 acre-treatments.

c/ Totals may not agree due to rounding.

Southwest. Tank-mixes accounted for about 317,000 pounds (a.i.) or about 18 percent of the total quantity applied.

PESTICIDE USE BY CROP

In the following sections, the major uses of pesticides by crop are discussed along with the primary pests controlled by these pesticides. Patterns of pesticide use discussed include acres treated, acre-treatments, times applied, rate per application, and annual rates by specific ingredient applied singly and in tank-mixes.

Cabbage

In 1979, approximately 24,000 acres of cabbage were planted for the fresh market in the Southwest, 22,000 acres in Texas and the remainder in Colorado. For the cabbage grown in these two States, nearly 300,000 pounds (a.i.) of all pesticides were applied in 250,000 acre-treatments (Tables 5 and 6).

Weeds affecting cabbage include crabgrass, goosegrass, pigweed, and purslane. Trifluralin was the major herbicide used accounting for about 50 percent of the total 48,500 herbicide acre-treatments in Texas and over 95 percent of the 1,300 acre-treatments in Colorado. Other herbicides included bensulide, DCPA, and nitrofen.

Major insect problems on cabbage in Texas and Colorado include imported cabbage worms, diamondbacked moths, and cabbage loopers. Methomyl was the most important insecticide used in both States in terms of acre-treatments followed by Bacillus thuringiensis, methamidophos, permethrin, and disulfoton. An average of about 1.5 to 3.0 applications of methamidophos and disulfoton was used compared with 5 to 6 applications of the other specified insecticides.

Diseases affecting cabbage in Texas include downy mildew, anthracnose, Alternaria leaf spot, gummy stem blight, and powdery mildew. Colorado cabbage

Table 5. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds of active ingredient		
	: treated	: treatments	: applied	: Per acre	: Annual	: Total
Pesticides	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Trifluralin	1,175	1,258	1.1	0.7	0.7	823
Other	--	45	--	6.8	--	304
Total	--	1,303	--	.9	--	1,127
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> d/	580	2,826	4.9	--	--	--
Methamidophos	932	1,302	1.4	.8	1.1	1,002
Methomyl	716	3,646	5.1	.5	2.4	1,735
Other	--	867	--	7.7	--	6,691
Total	--	8,641	--	1.1	--	9,428
<u>Fungicides</u>						
Chlorothalonil	25	25	1.0	.9	.9	22
<u>Nematicides</u>						
D-D	339	339	1.0	124.2	124.2	42,122
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> d/						
+ insecticides	818	974	1.2	.5	.7	530
Methamidophos						
+ insecticides	668	1,018	1.5	1.6	2.5	1,668
Methomyl						
+ insecticides	811	1,066	1.3	2.1	2.8	2,237
Parathion	327	952	2.9	.9	2.7	882
+ toxaphene				.8	2.3	742
Other	--	57	--	1.8	--	101
Total	--	4,067	--	1.5	--	6,160
TOTAL PESTICIDES	--	14,375	--	4.1	--	58,859

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,800 acres planted for the Summer fresh market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 6. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	3,347	5,484	1.6	3.9	6.3	21,191
DCPA	3,278	3,687	1.1	4.0	4.5	14,766
Nitrofen	504	681	1.4	2.2	3.0	1,510
Trifluralin	9,883	11,525	1.2	1.0	1.1	10,975
Other	--	81	--	.7	--	58
Total	--	21,458	--	2.3	--	48,500
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>	6,329	36,544	5.8	--	--	--
Disulfoton	6,100	10,019	1.6	3.0	5.0	30,246
Methamidophos	8,404	23,000	2.7	1.1	3.0	25,042
Methomyl	11,340	51,909	4.6	.5	2.3	26,286
Monocrotophos	1,481	5,463	3.7	.3	1.2	1,777
Permethrin	3,507	19,899	5.7	.3	1.8	6,155
Other	--	2,961	--	1.3	--	3,983
Total	--	149,795	--	.6	--	93,489
<u>Fungicides</u>						
Chlorothalonil	670	1,767	2.6	1.5	3.9	2,579
Methomyl	418	836	2.0	.4	.9	376
Maneb	8,178	51,293	6.3	1.5	9.5	77,630
Other	--	320	--	.7	--	211
Total	--	54,216	--	1.5	--	80,796
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>						
+ other materials	4,993	5,807	1.2	1.0	1.2	6,078
Endosulfan	396	716	1.8	.4	.7	285
+ methyl parathion				.2	.4	143
Maneb	199	866	4.4	1.6	7.0	1,386
+ methamidophos				.9	3.9	777
Maneb	127	1,524	12.0	1.6	19.2	2,438
+ permethrin				.2	2.7	339

-- continued

Table 6. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Methyl parathion	418	836	2.0	.8	1.5	627
+ toxaphene				.8	1.5	627
Other	--	720	--	1.8	--	1,261
Total	--	10,469	--	1.3	--	13,961
TOTAL PESTICIDES	--	235,938	--	1.0	--	236,746

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 21,900 acres planted for fresh market only: Winter - 11,100 acres, Spring - 4,300 acres, and Fall - 6,500 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

growers reported only minimal acreage treated with fungicides. Maneb accounted for about 95 percent of the total single ingredient fungicide applications to cabbage in Texas. Maneb was also used in tank-mix applications with methamidophos and permethrin.

Cantaloups

An estimated 29,100 acres of cantaloups were planted for harvest during the 1979 spring, summer, and fall seasons in the three Southwest States of Arizona, Colorado, and Texas. Texas accounted for about 65 percent and Arizona 30 percent of the Southwest cantaloup acreage. Approximately 184,000 pounds (a.i.) of all pesticides were used in the three States in about 119,000 acre-treatments (Tables 7, 8, and 9).

Bensulide and trifluralin accounted for nearly all of the herbicides used on cantaloups for controlling crabgrass, pigweed, purslane, and seedling Johnson-grass. Bensulide was used at an average rate per acre of about 4 pounds (a.i.) per time applied and trifluralin about 0.5 pounds (a.i.) per time applied.

Major insect problems on cantaloups in the Southwest were aphids, squash bugs, spider mites, and leafminers. Dimethoate and methomyl each accounted for about 30 percent of the insecticide acre-treatments in Texas. Crop specialists indicated that aphids and leafminers were the primary targets when growers use dimethoate, and squash bugs the primary target for methomyl. For the other two Southwest States, dicofol and Bacillus thuringiensis were the primary insecticides used on cantaloups in Arizona and parathion the primary insecticide in Colorado.

Disease problems on Southwest cantaloups included powdery mildew, downey mildew, anthracnose, gummy blight, and Alternaria leaf spot. In Texas, maneb comprised about 70 percent of the total fungicide acre-treatments applied as single ingredients. Other important fungicides in the three States included folpet, captafol, and chlorothalonil.

Table 7. Cantaloups: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Trifluralin	1,652	1,652	1.0	0.5	0.5	826
Other	--	11	--	5.0	--	55
Total	--	1,663	--	.5	--	881
<u>Insecticides</u>						
Dicofol	1,773	1,773	1.0	.9	.9	1,624
Dimethoate	705	.705	1.0	.3	.3	211
Other	--	77	--	.4	--	35
Total	--	2,555	--	.7	--	1,870
<u>Fungicides</u>						
Benomyl	2,455	7,707	3.1	2.2	6.8	16,790
Folpet	2,475	6,536	2.6	1.8	4.7	11,619
Other	--	11	--	1.6	--	18
Total	--	14,254	--	2.0	--	28,427
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>						
+ insecticides	1,101	1,101	1.0	--	--	74
Benomyl	473	473	1.0	.3	.3	118
+ dicofol				.6	.6	301
Benomyl	534	534	1.0	.6	.6	310
+ folpet				.9	.9	500
Other	--	297	--	1.6	--	465
Total	--	2,405	--	.7	--	1,768
TOTAL PESTICIDES	--	20,877	--	1.6	--	32,946

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 9,100 acres planted for fresh market: Spring - 5,100 acres, Summer - 2,000 acres, and Fall - 2,000 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 8. Cantaloups: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	: treated	: treatments	: applied	: Per time	: Annual	:
Pesticides	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	258	258	1.0	4.3	4.3	1,104
Trifluralin	163	163	1.0	.5	.5	82
Total	--	421	--	2.8	--	1,186
<u>Insecticides</u>						
Dimethoate	779	779	1.0	.3	.3	261
Parathion	1,196	2,019	1.7	.9	1.5	1,816
Other	--	86	--	.9	--	82
Total	--	2,884	--	.7	--	2,159
<u>Fungicides</u>						
Chlorothalonil	209	351	1.7	1.0	1.7	361
Copper sulfate	171	171	1.0	.8	.8	139
Other	--	4	--	1.4	--	6
Total	--	526	--	1.0	--	506
<u>Tank mixtures</u>						
Chlorothalonil	130	130	1.0	.9	.9	118
+ methyl parathion				.5	.5	65
Naptalam	103	103	1.0	1.0	1.0	101
+ chloramben				.5	.5	48
Other	--	41	--	2.8	--	116
Total	--	274	--	1.6	--	448
TOTAL PESTICIDES	--	4,105	--	1.0	--	4,299

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,000 acres planted for the Summer fresh market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 9. Cantaloups: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	4,618	5,484	1.2	4.0	4.8	22,042
Trifluralin	3,530	3,854	1.1	.6	.7	2,375
Other	--	100	--	.4	--	38
Total	--	9,438	--	2.6	--	24,455
<u>Insecticides</u>						
<u>Bacillus</u>						
thuringiensis d/	862	2,380	2.8	--	--	--
Diazinon	523	523	1.0	1.9	1.9	988
Dimethoate	4,148	12,536	3.0	.4	1.1	4,429
Methomyl	4,131	12,565	3.0	.6	1.7	7,203
Mevinphos	418	1,254	3.0	.2	.7	279
Parathion	668	1,018	1.5	.5	.8	509
Other	--	6,625	--	1.1	--	7,547
Total	--	36,901	--	.6	--	20,955
<u>Fungicides</u>						
Benomyl	2,791	3,495	1.3	.5	.6	1,797
Captafol	1,045	4,180	4.0	1.8	7.0	7,336
Chlorothalonil	525	2,345	4.5	.6	2.7	1,399
Maneb	6,913	33,430	4.8	1.4	6.8	46,902
Total	--	43,450	--	1.3	--	57,434
<u>Nematicides</u>						
D-D	1,079	1,079	1.0	36.0	36.0	38,862
<u>Tank mixtures</u>						
Benomyl	387	773	2.0	0.3	.5	193
+ maneb				.4	.8	309
+ mevinphos				.1	.2	90
Dicofol	496	1,489	3.0	.2	.6	276
+ toxaphene				.1	.2	82

-- continued

Table 9. Cantaloups: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	:	:	:	: Per acre		
	:	:	:	: Per time : Annual		
	:	:	:	: applied : average : Total		
	: Acres	: Acre-	: Times			
	: treated	: treatments	: applied			
	: c/	:	:			
<u>Tank mixtures (cont'd)</u>						
Methyl parathion	470	470	1.0	3.0	3.0	1,411
+ parathion				6.0	6.0	2,822
Other	--	105	--	1.6	--	164
Total	--	2,836	--	1.9	--	5,347
TOTAL PESTICIDES	--	93,705	--	1.6	--	147,053

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 19,000 acres planted for the fresh market: Spring - 12,500 acres and Summer - 6,500 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Carrots

As with cantaloups, most of the Southwest carrot acreage is in Texas. Of the 24,000 acres in the region, nearly 21,000 acres are in Texas. In 1979, an estimated 204,000 pounds (a.i.) of all pesticides were applied in 67,000 acre-treatments in the three Southwest States (Tables 10, 11, and 12).

Linuron and trifluralin accounted for nearly all of the herbicides used in the three States to control shepherdspurse, crabgrass, pigweed, and wild mustard. Both were used at an average per application rate of 0.5 to 0.8 pounds (a.i.) per acre.

Flea beetles, carrot beetles, and vegetable weevils were the major insects affecting carrot production in the Southwest. Methomyl accounted for about 85 percent of the acre-treatments applied in single ingredient applications in Arizona. Diazinon, parathion, and toxaphene were the important insecticides used in Texas.

Powdery mildew is the primary disease problem in Southwest carrot production. For single ingredient applications, the surveyed growers indicated that maneb accounted for nearly all of the acre-treatments for controlling powdery mildew and other diseases. In Texas, copper hydroxide plus sulfur comprised nearly 70 percent of the acre-treatments using tank-mix applications.

D-D and ethylene dibromide were used for root knot nematode control in Arizona and Texas, respectively.

Cucumbers

In 1979, about one-half of the Texas cucumber acreage and all of the Colorado acreage was grown for the processing market. About 18,700 total acres of cucumbers were grown in the two States, with Texas growers accounting for about 85 percent of the total acres planted. Cucumbers are not grown for the commercial market in Arizona. About 8,400 pounds (a.i.) of all pesticides were used for nearly

Table 10. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Linuron	688	688	1.0	0.8	0.8	516
Trifluralin	1,277	1,277	1.0	.5	.5	639
Total	--	1,965	--	.6	--	1,155
<u>Insecticides</u>						
Diazinon	473	473	1.0	.5	.5	237
Methomyl	1,255	2,455	2.0	.4	.9	1,105
Total	--	2,928	--	.5	--	1,342
<u>Fungicides</u>						
Maneb	380	963	2.5	.9	2.2	841
<u>Nematicides</u>						
D-D	859	859	1.0	58.0	58.0	49,775
TOTAL PESTICIDES	--	6,715	--	7.9	--	53,113

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 2,000 acres planted for fresh and processing markets (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 11. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Linuron	126	126	1.0	0.6	0.6	75
Trifluralin	58	58	1.0	.5	.5	31
Total	--	184	--	.6	--	106
<u>Insecticides</u>						
Diazinon	24	24	1.0	1.1	1.1	27
Other	--	273	--	.3	--	68
Total	--	297	--	.3	--	95
TOTAL PESTICIDES	--	481	--	.4	--	201

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,100 acres planted for fresh and processing markets (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 12. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	: treated	: treatments	: applied	: Per time	: Annual	:
Pesticides	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Linuron	4,317	7,779	1.8	0.8	1.5	6,449
Nitrofen	333	459	1.4	.5	.7	222
Trifluralin	5,278	6,611	1.3	.8	1.0	5,371
Other	--	120	--	5.0	--	600
Total	--	14,969	--	.8	--	12,642
<u>Insecticides</u>						
<u>Bacillus</u>						
thuringiensis d/	60	420	7.0	--	--	--
Diazinon	1,621	1,810	1.1	.9	.9	1,541
Parathion	1,080	1,927	1.8	1.0	1.7	1,852
Toxaphene	1,254	1,254	1.0	1.0	1.0	1,254
Other	--	1,252	--	.7	--	847
Total	--	6,663	--	.8	--	5,494
<u>Fungicides</u>						
Maneb	8,122	34,655	4.3	1.5	6.4	52,181
Other	--	168	--	4.2	--	706
Total	--	34,823	--	1.5	--	52,887
<u>Nematicides</u>						
<u>Ethylene</u>						
dibromide	1,254	1,254	1.0	51.0	51.0	63,992
<u>Tank mixtures</u>						
Copper hydroxide	557	1,446	2.6	8.3	21.5	11,988
+ sulfur				4.7	12.3	6,833
MSMA	260	260	1.0	.4	.4	116
+ prometryn				.1	.1	29

-- continued

Table 12. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Other	--	430	--	1.5	--	631
Total	--	2,136	--	9.2	--	19,597
TOTAL PESTICIDES	--	59,845	--	2.6	--	154,621

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 20,600 acres planted for fresh and processing markets (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

3,900 acre-treatments of cucumbers in Texas and Colorado (Tables 13 and 14).

Naptalam and bensulide were the only herbicides reported by growers and were used for controlling pigweed, crabgrass, and purslane.

Cucumber beetles were the primary insect pests affecting cucumbers. Carbaryl and phosdrin comprised nearly 100 percent of the insecticide acre-treatments in Colorado, and methomyl about 35 percent of the acre-treatments in Texas.

Diseases of cucumbers included angular leaf spot, powdery mildew, downy mildew, and anthracnose. Copper sulfate accounted for 70 percent and maneb nearly 20 percent of the 1,000 acre-treatments in Colorado. Surveyed Texas growers indicated maneb was the only fungicide used in approximately 1,200 acre-treatments.

Lettuce

An estimated 58,000 acres of lettuce were planted in the Southwest during the 1979 winter, spring, summer, and fall seasons. Texas growers planted for the fall season only compared to three seasons for Arizona and two for Colorado. Arizona growers accounted for about 80 percent for the Southwest acreage. For the three Southwest States, an estimated 268,000 pounds (a.i.) of all pesticides were used for about 253,000 acre-treatments (Tables 15, 16, and 17).

Benefin was the major herbicide used in each of the three States followed in importance by pronamide, propham, and trifluralin. The rate for benefin varied from an average of 0.5 pounds (a.i.) per application in Colorado to 1.2 pounds (a.i.) in Arizona, and 4.6 pounds (a.i.) in Texas.

The major insects affecting lettuce include cabbage loopers, beet armyworms, imported cabbageworms, corn earworms, and aphids. Methomyl comprised nearly 40 percent of the total insecticide acre-treatments applied as single ingredients in Arizona and 30 percent of the total in Texas. Bacillus thuringiensis was

Table 13. Cucumbers: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	62	62	1.0	1.8	1.8	109
Naptalam	152	152	1.0	1.6	1.6	238
Total	--	214	--	1.6	--	347
<u>Insecticides</u>						
Carbaryl	152	167	1.1	2.5	2.7	411
Mevinphos	86	172	2.0	.2	.4	38
Other	--	5	--	1.0	--	5
Total	--	344	--	1.3	--	454
<u>Fungicides</u>						
Copper sulfate	401	722	1.8	1.1	2.1	823
Mancozeb	57	189	3.3	.9	2.8	160
Other	--	107	--	3.4	--	362
Total	--	1,018	--	1.3	--	1,345
<u>Tank mixtures</u>						
Copper sulfate	11	11	1.0	.8	.8	9
+ mancozeb				1.6	1.6	17
TOTAL PESTICIDES	--	1,587	--	1.4	--	2,172

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 2,400 acres planted for processing market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 14. Cucumbers: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	99	99	1.0	6.0	6.0	596
<u>Insecticides</u>						
Carbaryl	13	25	1.9	2.5	5.0	63
Methomyl	99	298	3.0	.4	1.4	134
Other	--	580 <u>d/</u>	--	.4	--	209
Total	--	903	--	.4	--	406
<u>Fungicides</u>						
Maneb	327	1,192	3.6	1.4	5.0	1,647
<u>Nematicides</u>						
D-D	99	99	1.0	36.0	36.0	3,574
TOTAL PESTICIDES	--	2,293	--	2.7	--	6,223

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 16,300 acres planted: 8,500 acres for the processing market and 7,800 acres for the fresh market: Spring - 2,900 acres, Summer - 1,300 acres, and Fall - 3,600 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Information was not available on some of the pesticides included in other category.

Table 15. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Benefin	8,843	9,029	1.0	1.2	1.3	11,093
Pronamide	3,176	3,176	1.0	1.0	1.0	3,150
Propham	1,623	1,623	1.0	2.7	2.7	4,303
Other	--	204	--	4.9	--	991
Total	--	14,032	--	1.4	--	19,537
<u>Insecticides</u>						
Acephate	3,836	5,992	1.6	.8	1.2	4,737
<u>Bacillus</u>						
<u>thuringiensis d/</u>	2,834	3,862	1.4	--	--	--
Diazinon	2,244	4,049	1.8	.6	1.0	2,233
Dimethoate	1,266	1,266	1.0	.3	.3	366
Endosulfan	2,448	2,922	1.2	.9	1.1	2,583
Methomyl	8,973	23,996	2.7	.7	2.0	17,648
Mevinphos	4,724	14,904	3.2	.9	2.9	13,794
Permethrin	3,698	5,117	1.4	.2	.2	805
Phorate	771	771	1.0	1.0	1.0	751
Other	--	1,178	--	3.4	--	4,047
Total	--	64,057	--	.7	--	46,964
<u>Fungicides</u>						
Maneb	3,147	7,027	2.2	1.4	3.2	10,081
Other	--	117	--	2.0	--	233
Total	--	7,144	--	1.4	--	10,314
<u>Tank mixtures</u>						
Acephate						
+ fungicides						
+ insecticides	1,586	2,115	1.3	1.4	1.7	2,757
<u>Bacillus</u>						
<u>thuringiensis d/</u>	5,397	9,945	1.8	--	--	--
+ methomyl				.6	1.2	6,221
<u>Bacillus</u>						
<u>thuringiensis d/</u>	1,751	1,909	1.1	--	--	--
+ mevinphos				.6	.6	1,077

-- continued

Table 15. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank-mixtures (cont'd)</u>						
Bacillus						
<u>thuringiensis</u> <u>d/</u>	7,815	27,824	3.6	.3	1.1	8,912
+ fungicides						
+ insecticides						
Copper sulfate	656	656	1.0	2.5	2.5	1,634
+ insecticides						
+ fungicides						
Endosulfan	6,587	13,956	2.1	1.1	2.4	15,715
+ methomyl				.6	1.2	8,162
Methomyl	1,134	2,268	2.0	.4	.9	1,021
+ methyl parathion				.6	1.2	1,414
Methomyl	1,415	3,117	2.2	.6	1.4	1,983
+ methyl parathion				.3	.6	811
+ parathion				.5	1.1	1,622
Other	--	2,623	--	7.3	--	19,103
Total	--	69,191	--	1.2	--	80,849
TOTAL PESTICIDES	--	154,424	--	1.0	--	157,664

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 45,600 acres planted for the fresh market: Winter - 14,100 acres, Spring - 13,600 acres; and Fall - 17,900 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 16. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Benefin	4,999	5,183	1.0	0.5	0.5	2,586
Other	--	53	--	3.8	--	201
Total	--	5,236	--	0.5	--	2,787
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> d/	4,745	13,632	2.9	--	--	--
Endosulfan	1,962	3,924	2.0	1.0	1.9	3,783
Methomyl	121	209	1.7	0.4	0.7	89
Mevinphos	1,101	1,281	1.2	0.3	0.4	398
Parathion	1,913	2,072	1.1	1.0	1.1	2,137
Other	--	46	--	1.1	--	50
Total	--	21,164	--	0.3	--	6,457
<u>Fungicides</u>						
Maneb	2,058	5,635	2.7	1.8	4.9	10,179
Other	--	360	--	0.8	--	292
Total	--	5,995	--	1.7	--	10,471
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis</u>						
+ fungicides						
+ insecticides	4,775	5,250	1.1	1.5	1.7	8,002
Endosulfan						
+ fungicides						
+ insecticides	3,234	3,234	1.0	3.7	3.7	12,067
Methomyl						
+ fungicides						
+ insecticides	2,695	2,695	1.0	3.1	3.1	8,270
Parathion	1,224	1,348	1.1	1.0	1.1	1,341
+ toxaphene				2.2	2.4	2,957
Other	--	1,423	--	4.2	--	5,920
Total	--	13,950	--	2.8	--	38,557
TOTAL PESTICIDES	--	46,345	--	1.3	--	58,272

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 10,500 acres planted in fresh market: Winter - 4,200 acres and Summer - 6,300 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 17. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments :	: Times : applied :	: Pounds of active ingredient		
				: Per acre		: Total
				: Per time	: Annual	
				: applied	: average	
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	2,805	2,962	1.1	4.6	4.9	13,724
Pronamide	2,527	2,527	1.0	1.1	1.1	2,750
Trifluralin	561	887	1.6	.6	1.0	550
Other	--	155	--	2.2	--	336
Total	--	6,531	--	2.7	--	17,360
<u>Insecticides</u>						
Acephate	1,359	6,793	5.0	1.1	5.6	7,642
<u>Bacillus</u>						
<u>thuringiensis d/</u>	483	2,208	4.6	--	--	--
Carbaryl	1,332	3,985	3.0	1.9	5.8	7,730
Methomyl	1,950	10,672	5.5	.4	2.0	3,910
Mevinphos	947	2,203	2.3	.5	1.1	1,074
Parathion	629	4,591	7.3	.7	4.9	3,057
Permethrin	871	3,355	3.9	.2	.9	748
Toxaphene	1,359	1,359	1.0	1.4	1.4	1,834
Other	--	675	--	.8	--	557
Total	--	35,841	--	.7	--	26,552
<u>Fungicides</u>						
Chlorothalonil	443	443	1.0	1.4	1.4	618
Maneb	416	2,492	6.0	1.4	8.6	3,573
Total	--	2,935	--	1.4	--	4,191
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>	233	2,101	9.0	--	--	--
+ carbaryl				.2	2.2	509
+ methomyl				.3	2.4	563
<u>Bacillus</u>						
<u>thuringiensis d/</u>	376	3,762	10.0	--	--	--
+ carbaryl				.1	.6	226
+ parathion				.5	5.3	1,994
Other	--	738	--	1.0	--	733
Total	--	6,601	--	.6	--	4,025
TOTAL PESTICIDES	--	51,908	--	1.0	--	52,128

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,900 acres planted for the Fall fresh market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

the primary insecticide used in Colorado, accounting for about 65 percent of the total acre-treatments. Other important insecticides used on Southwest lettuce included phosdrin, acephate, permethrin, diazinon, and endosulfan. The average number of times the insecticides were applied ranged from one time for toxaphene to five times for acephate.

Downy mildew was the principal disease affecting lettuce. In 1979, maneb was used for about 90 percent of the single ingredient acre-treatments in each of the three States.

Tank-mixes comprised 45 percent of the total applications on lettuce in Arizona, 30 percent in Colorado, and 13 percent in Colorado. Bacillus thuringiensis, carbaryl, endosulfan, methomyl, and parathion were some of the important insecticides used in tank-mixes with fungicides and other insecticides..

Onions

In 1979, an estimated 42,500 acres were planted for the fresh and processing markets. Nearly 33,000 or 80 percent of the total acreage was planted in Texas with about 8,200 acres in Colorado and 1,600 acres in Arizona. For the three Southwest States, approximately 0.5 million pounds of all pesticides were used for nearly 0.3 million acre-treatments (Tables 18, 19, and 20).

In Texas, bensulide accounted for about 45 percent of the 37,000 herbicide acre-treatments applied as single ingredients on onions for controlling crabgrass, pigweed, and purslane. DCPA was also important in Texas and as well as in Colorado and Arizona for controlling goosegrass and crabgrass. The annual average rate per acre ranged from 6.7 pounds (a.i.) of DCPA to 0.9 pounds (a.i.) of trifluralin.

Thrips were the primary insect pests affecting Southwest onion production. Parathion and toxaphene comprised about 80 percent of the acre-treatments applied using single ingredients in Texas and Colorado. Arizona onion growers used

Table 18. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
DCPA	1,506	1,616	1.1	4.7	5.0	7,569
<u>Insecticides</u>						
Diazinon	286	573	2.0	.5	1.0	286
Methomyl	1,470	2,736	1.9	.4	.8	1,231
Mevinphos	271	542	2.0	.7	1.3	353
Other	--	352	--	.4	--	129
Total	--	4,203	--	.5	--	1,999
<u>Fungicides</u>						
Maneb	1,479	3,207	2.2	1.3	2.9	4,299
Other	--	289	--	1.4	--	405
Total	--	3,496	--	1.3	--	4,704
<u>Tank mixtures</u>						
Diazinon	815	2,136	2.6	.5	1.3	1,068
+ mevinphos				.5	1.3	1,068
TOTAL PESTICIDES	--	11,451	--	1.4	--	16,408

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,600 acres planted for the Spring non-storage onion market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 19. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/

	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments:	: applied	:Per time	: Annual	:
Pesticides	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
DCPA	4,319	4,880	1.1	5.9	6.7	28,812
Nitrofen	1,670	3,098	1.9	2.0	3.6	6,065
Other	--	490	1.2	2.9	--	1,404
Total	--	8,468	--	4.3	--	36,281
<u>Insecticides</u>						
Ethion	576	576	1.0	.7	.7	427
Parathion	2,994	7,344	2.5	.7	1.6	4,817
Toxaphene	1,394	3,533	2.5	1.0	2.5	3,552
Other	--	1,601	1.0	.9	--	1,424
Total	--	13,054	--	.8	--	10,220
<u>Fungicides</u>						
Chlorothalonil	1,191	2,417	2.0	.9	1.8	2,132
Mancozeb	863	1,689	2.0	1.4	2.8	2,418
Maneb	903	1,994	2.2	1.5	3.3	3,002
Other	--	132	1.0	2.4	--	315
Total	--	6,232	--	1.3	--	7,867
<u>Sprout control</u>						
Maleic hydrazide	1,460	1,460	1.0	2.9	2.9	4,164
<u>Tank mixtures</u>						
Copper compounds						
+ insecticides						
+ fungicides	568	668	1.2	3.2	3.7	2,119
DCPA	488	488	1.0	7.7	7.7	3,773
+ diazinon				1.4	1.4	693
Methyl parathion						
+ fungicides						
+ insecticides	1,467	3,166	2.2	2.3	5.1	7,409
Parathion	415	843	2.0	1.0	2.0	843
+ sulfur				4.2	8.6	3,552
+ toxaphene				1.0	2.1	854

-- continued

Table 19. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Colorado, 1979 a/ b/ --continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Parathion	1,918	5,486	2.9	.8	2.3	4,353
+ toxaphene				1.2	3.5	6,751
Other	--	1,455	1.0	3.1	--	4,513
Total	--	12,106	--	2.9	--	34,860
TOTAL PESTICIDES	--	41,320	--	2.3	--	93,392

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 8,200 acres planted for the Spring storage onion market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 20. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	: treated	: treatments	: applied	: Per time	: Annual	:
	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	14,701	16,296	1.1	3.6	4.0	58,765
DCPA	6,296	9,368	1.5	4.4	6.6	41,682
Isopropalin	2,720	3,021	1.1	4.8	5.4	14,639
Nitrofen	3,027	3,027	1.0	2.2	2.2	6,691
Trifluralin	3,337	5,367	1.6	.6	.9	3,134
Other	--	175	--	1.4	--	239
Total	--	37,254	--	3.4	--	125,150
<u>Insecticides</u>						
Diazinon	1,825	2,721	1.5	1.4	2.2	3,947
Methomyl	2,000	2,992	1.5	.8	1.2	2,432
Parathion	3,982	14,523	3.6	.6	2.2	8,689
Toxaphene	5,437	13,305	2.4	1.3	3.2	17,407
Other	--	1,207	--	.8	--	910
Total	--	34,748	--	1.0	--	33,385
<u>Fungicides</u>						
Captafol	718	3,590	5.0	.9	4.4	3,150
Chlorothalonil	856	2,657	3.1	.5	1.6	1,367
Maneb	16,503	129,650	7.9	1.7	13.0	214,813
Other	--	649	--	.5	--	297
Total	--	136,546	--	1.6	--	219,627
<u>Tank mixtures</u>						
Bensulide	836	836	1.0	4.0	4.0	3,343
+ DCPA				.2	.2	167
Diazinon	919	5,516	6.0	.1	.3	275
+ maneb				1.2	7.4	6,826
+ parathion				.3	1.9	1,755
Maneb	2,079	6,252	3.0	1.6	4.8	9,907
+ parathion				.6	1.7	3,554
Methyl parathion	762	1,898	2.5	2.8	6.9	5,234
+ toxaphene				2.8	6.9	5,234

-- continued

Table 20. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Parathion	941	3,762	4.0	.2	.6	571
+ toxaphene				.6	2.6	2,412
Other	--	4,119	--	2.7	--	11,531
Total	--	22,383	--	2.3	--	50,809
TOTAL PESTICIDES	--	230,931	--	1.9	--	428,971

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 32,700 acres planted for storage onion market: Spring - 24,500 acres and Summer - 8,200 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

methomyl for about 65 percent of their single ingredient acre-treatments for thrip control. For tank-mixes, the important insecticides included parathion, toxaphene, and diazinon.

Powdery mildew, downy mildew, purple blotch, and gray mold were some of the major diseases affecting onions. Maneb was the principal fungicide used by Southwest growers for single ingredient and for tank-mix applications. Other fungicides included chlorothalonil, captafol, and mancozeb.

Colorado growers used maleic hydrazide in 1,500 acre-treatments during the growing season to control onion sprouting during storage.

Snap beans

In the Southwest region, an estimated 1,700 acres of snap beans were planted in Colorado in 1979, and none were grown commercially in Arizona and Texas. Approximately 5,000 pounds (a.i.) of all pesticides were applied in about 3,900 acre-treatments (Table 21).

EPTC and trifluralin were the principal herbicides for both single ingredient and tank-mix applications. They were used to control redroot pigweed, lambs-quarters, watergrass, kochia, nightshade, and foxtail.

Carbaryl accounted for nearly all of the insecticides growers used for controlling Mexican bean beetles, flea beetles, grasshoppers, and cutworms. Of the total 1,700 acres, nearly 1,200 acres were treated 1.3 times using carbaryl at an average rate of 0.7 pounds (a.i.) per acre.

Copper sulfate was the only fungicide reported for controlling bacterial blight and halo blight, the major diseases affecting snap beans in Colorado.

Sweet corn

Nearly 5,000 acres of sweet corn were planted for harvest during the spring season in Texas and the summer season in Colorado. Only the Texas growers were

Table 21. Snap beans: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	:	:	:	: Per acre :		
	: Acres	: Acre-	: Times	: Per time	: Annual	:
	:treated	:treatments	: applied	:Per time	: average	: Total
	: c/	:	:	:applied	:	:
<u>Single applications</u>						
<u>Herbicides</u>						
EPTC	688	688	1.0	2.2	2.2	1,541
Trifluralin	570	570	1.0	.5	.5	309
Other	--	8	--	1.8	--	16
Total	--	1,266	--	1.5	--	1,866
<u>Insecticides</u>						
Carbaryl	1,377	1,546	1.1	.7	.8	1,135
Other	--	21	--	.4	--	10
Total	--	1,567	--	.7	--	1,145
<u>Fungicides</u>						
Copper sulfate	236	307	1.3	.8	1.1	248
<u>Tank mixtures</u>						
EPTC	681	681	1.0	1.6	1.6	1,094
+ trifluralin				.5	.5	348
Other	--	52	--	5.8	--	304
Total	--	733	--	2.4	--	1,746
TOTAL PESTICIDES	--	3,873	--	1.3	--	5,005

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,700 acres planted for the processing market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

surveyed in the 1979 Vegetable Pesticide Survey. Sweet corn was not grown for commercial production in Arizona. An estimated 46,000 pounds (a.i.) of all pesticides were used by Texas growers for 48,000 acre-treatments (Table 22).

Trifluralin was the only herbicide indicated by surveyed growers and was used to treat 350 acres at a rate of 0.5 pounds (a.i.) per acre. To avoid damage to sweet corn, trifluralin must be applied after corn is planted. It will kill sweet corn if applied preplant incorporated.

Methomyl was the primary insecticide used to control corn earworms and fall armyworms. It was applied in about 24,000 acre-treatments at an average of 0.9 pounds (a.i.) per acre. Methomyl also was tank-mixed with carbaryl for 21,000 acre-treatments.

Helminthosporium leaf spot, the major disease affecting sweet corn in Texas, was controlled by maneb in about 2,600 acre-treatments at an average rate of 1.6 pounds (a.i.) per treatment.

Tomatoes

In 1979, an estimated 10,300 acres of tomatoes were planted in Texas and Colorado for harvest during the spring, summer, and fall seasons. Tomatoes are not grown for commercial production in Arizona. Only the Texas growers, which accounted for about 90 percent of the total 10,300 acres, were surveyed in the 1979 Vegetable Pesticide Survey. Texas growers used an estimated 24,000 pounds (a.i.) of all pesticide for about 20,000 acre-treatments (Table 23).

Nearly 1,500 herbicide acre-treatments were made by Texas growers to control crabgrass, goosegrass, pigweed, purslane, and seedling Johnsongrass. Bensulide, naptalam, and trifluralin were the major herbicides used.

Leafminers, aphids, cutworms, and fruitworms are the major insects affecting tomatoes. Diazinon and methomyl comprised about 50 percent of the acre-treatments for controlling these insects. Others included parathion,

Table 22. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Trifluralin	350	.350	1.0	.5	.5	175
<u>Insecticides</u>						
Methomyl	2,667	24,129	9.0	.9	8.0	21,376
Other	--	38	--	1.7	--	63
Total	--	24,167	--	.9	--	21,439
<u>Fungicides</u>						
Maneb	2,625	2,625	1.0	1.6	1.6	4,200
<u>Tank mixtures</u>						
Carbaryl	2,625	21,000	8.0	.6	4.8	12,720
+ methomyl				.3	2.7	7,088
Total	--	21,000	--	.9	--	19,808
TOTAL PESTICIDES	--	48,142	--	.9	--	45,622

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,500 acres planted for the Spring fresh market (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 23. Tomatoes: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	441	464	1.1	3.0	3.2	1,394
Napropamide	237	296	1.2	.5	.6	145
Trifluralin	224	224	1.0	1.1	1.1	243
Other	--	479	--	2.9	--	1,397
Total	--	1,463	--	2.2	--	3,179
<u>Insecticides</u>						
Carbaryl	400	929	2.3	1.1	2.6	1,034
Diazinon	438	3,063	7.0	.4	3.0	1,292
Methomyl	594	2,365	4.0	1.0	3.8	2,252
Mevinphos	418	1,254	3.0	.3	.8	314
Parathion	590	1,311	2.2	.5	1.1	645
Toxaphene	131	480	3.7	1.2	4.2	556
Other	--	748	--	.7	--	557
Total	--	10,150	--	.7	--	6,650
<u>Fungicides</u>						
Captafol	261	1,045	4.0	1.8	7.0	1,834
Maneb	862	4,686	5.4	1.6	8.6	7,376
Other	--	599	--	.8	--	450
Total	--	6,330	--	1.5	--	9,660
<u>Tank mixtures</u>						
Methomyl	418	1,672	4.0	.9	3.6	1,505
+ maneb				1.2	4.8	2,006
Other	--	494	--	2.2	--	1,075
Total	--	2,166	--	2.1	--	4,586
TOTAL PESTICIDES	--	20,109	--	1.2	--	24,075

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 9,500 acres planted: 2,500 for the processing market and 7,000 for the fresh market: Spring - 3,300 acres, Summer - 3,100 acres, and Fall - 600 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

phosdrin, and carbaryl.

Maneb was the primary fungicide used to control anthracnose, early and late blights, Septoria leaf spot, and gray mold rot. Maneb was used for about 75 percent of the total insecticide acre-treatments applied as a single ingredient and as a tank-mix. Captafol accounted for about 15 percent of the single ingredient applications.

Watermelons

Approximately 57,300 acres of watermelons were planted for harvest during the 1979 spring and summer seasons in Texas and Arizona. Watermelons were not grown for commercial production in Colorado. Nearly 140,000 pounds (a.i.) of all pesticides were used by Texas and Arizona growers for about 123,000 acre-treatments (Tables 24 and 25).

Texas growers used trifluralin in about 60 percent of the nearly 18,000 total herbicide acre-treatments. In Arizona, bensulide was the only herbicide reported for about 260 acre-treatments.

Squash bugs, aphids, melonworms, leafminers, leafhoppers, darkling beetles, and cucumber beetles are the major insects affecting watermelons. In Texas, parathion accounted for about 50 percent of the 33,000 insecticide acre-treatments. Other important insecticides in Texas included carbaryl, parathion, Bacillus thuringiensis, and diazinon. In Arizona, growers used endosulfan and demeton for about 90 percent of the nearly 1,000 acre-treatments.

Downy mildew, anthracnose, and gummy blight were the major diseases controlled primarily by maneb and chlorothalonil. Captafol also was important for both single ingredient and tank-mix applications.

Table 24. Watermelons: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Arizona, 1979 a/ b/

	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments:	: applied	:Per time	: Annual	:
Pesticides	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	264	264	1.0	5.0	5.0	1,321
<u>Insecticides</u>						
Demeton	440	440	1.0	.6	.6	248
Endosulfan	440	440	1.0	.5	.5	211
Other	--	88	--	.4	--	35
Total	--	968	--	.5	--	494
<u>Tank mixtures</u>						
<u>Bacillus</u>						
<u>thuringiensis d/</u>						
+ insecticides	704	968	1.4	.7	.6	406
TOTAL PESTICIDES	--	2,200	--	1.0	--	2,221

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 6,800 acres planted for the fresh market: Spring - 2,500 acres and Summer - 4,300 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 25. Watermelons: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Texas, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	1,491	1,771	1.2	3.2	3.8	5,704
DCPA	792	4,752	6.0	.5	3.0	2,376
Trifluralin	9,310	10,988	1.2	.5	.6	5,867
Other	--	481	--	.7	--	336
Total	--	17,992	--	.8	--	14,283
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> <u>d/</u>	1,200	2,400	2.0	--	--	--
Carbaryl	3,945	5,757	1.5	1.2	1.7	6,819
Diazinon	792	1,584	2.0	.4	.8	594
Dimethoate	619	890	1.4	.5	.8	464
Methomyl	768	3,034	4.0	1.0	4.7	2,991
Parathion	6,097	16,432	2.7	.5	1.4	8,788
Other	--	2,584	--	1.8	--	4,581
Total	--	32,681	--	.7	--	24,237
<u>Fungicides</u>						
Benomyl	1,224	1,563	1.3	.3	.4	540
Captafol	3,290	6,657	2.0	1.4	2.9	9,602
Chlorothalonil	8,277	22,858	2.8	1.0	2.6	21,893
Maneb	5,312	26,630	5.0	1.3	6.4	34,049
Total	--	57,708	--	1.1	--	66,084
<u>Tank mixtures</u>						
Captafol	2,263	4,525	2.0	1.3	2.6	5,956
+ naled				1.0	2.0	4,437
Chlorothalonil	407	1,629	4.0	2.3	9.3	3,780
+ dimethoate				.4	1.5	596
Disulfoton	2,263	4,525	2.0	1.0	2.0	4,582
+ naled				.7	1.3	2,958
Other	--	1,744	--	5.4	--	9,340
Total	--	12,423	--	2.5	--	31,649
TOTAL PESTICIDES	--	120,804	--	1.1	--	136,253

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 50,500 acres planted for the fresh market: Spring - 25,500 acres, and Summer - 25,000 acres (Table 2).

c/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

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